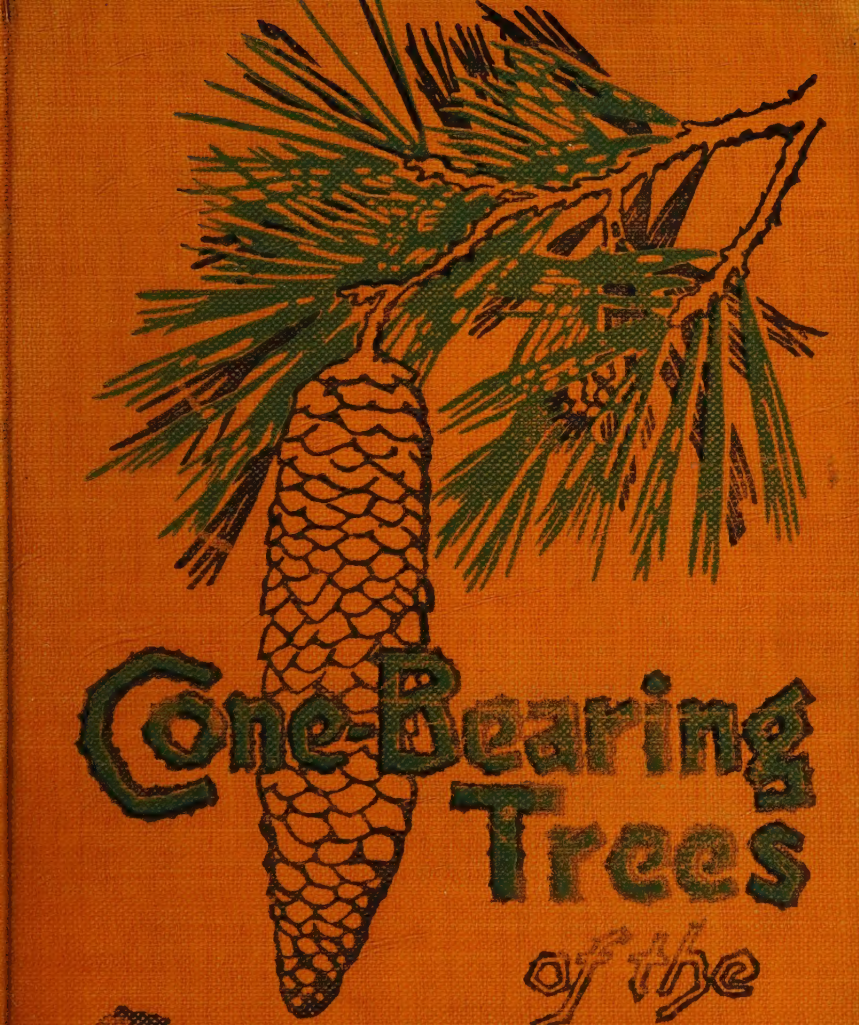

Cone-Bearing Trees of the California Mountains

J. SMEATON CHASE

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(Joseph Smeaton), b.
Cone-bearing trees of
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CONE-BEARING TREES

OF THE

CALIFORNIA MOUNTAINS

CONE-BEARING TREES

OF THE

CALIFORNIA MOUNTAINS

BY

J. SMEATON CHASE

AUTHOR OF "YOSEMITE TRAILS"

FULLY ILLUSTRATED FROM PHOTOGRAPHS AND DRAWINGS

CHICAGO
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INTRODUCTION

IN sending out this little book dealing with an extensive subject, it is necessary to preface it with a few explanatory paragraphs. It is prepared not by a botanist for botanists, nor by a botanist for students, but by a tree-lover for tree-lovers, and aims simply at enabling any one going into our California mountains to distinguish the pines, firs, and other coniferous trees he may meet.

The writer has carefully avoided technical terms, except in the necessary regard of giving the definite botanical names, and has restricted himself to noting the broad characteristics of each species, in order to secure simplicity. In larger books the reader would find a multitude of differentiations, particularizations, and exceptions which are valuable and necessary for close students, but would bring only mystification and uncertainty to the great majority of those for whom especially this manual is intended. Guided by the illustrations provided in this small book and the typical characteristics given in the text, the traveller in our mountains will have little or no difficulty in recognizing his tree-company.

Be it remembered, however, that families of trees, like races of men, may vary greatly in their individuals.

In general habit of growth, and to some extent in the detail of features, they are disturbed by circumstances outside the normal. In exposed positions the bark is likely to be redder and the leaves shorter than is usual, and the shape of the tree may be quite irregular; young trees will be found to vary from the mature type in some particulars; and any species of tree will modify its growth according as it stands in close or open forest. The characteristics here noted are the features of the full-grown trees in their normal growth, and they are stated with as much both of exactness and elasticity as careful consideration in each case seemed to warrant.

Only the inland and mountain species of the California conifers are described in this book. The coast species are limited to a very few beyond those which are referred to in connection with certain of the mountain trees. To name them briefly, they are:

Pinus radiata, the well-known Monterey-pine, widely cultivated in gardens.

Pinus torreyana, the unique Torrey-pine, found only in a small locality near the mouth of the Soledad River in San Diego County and on Santa Rosa Island.

Pinus muricata, the Prickle-cone-pine, which grows on the coast of Northern, Middle, and Lower California (not in Southern California), and on Cedros Island.

Pinus contorta, the Scrub-pine or Beach-pine, growing near the coast in Northern California. (See reference on p. 37 under head of *P. murrayana.*)

Abies venusta, the Bristle-cone-fir, confined to the Santa Lucia Mountains near the coast of Monterey County: and *A. grandis,* or Grand-fir, found in the northern coast counties of the State.

Tsuga heterophylla, the Coast-hemlock, inhabiting the northern coast region as far south as Mendocino County.

Picea sitchensis, the Sitka-spruce, growing near the coast of the northern counties. (There is also a mountain spruce, *P. breweriana* or Weeping-spruce, found in the extreme north of the State. The tree is rare, and has not been illustrated in this book.)

Beyond these there are the following cedars and cypresses, mainly confined to the coast regions, *viz.*: the Port Orford cedar, *Chamaecyparis lawsoniana,* and the Red-cedar or Arborvitæ, *Thuja plicata;* the well-known Monterey-cypress, *Cupressus macrocarpa,* used so generally for hedges and windbreaks, and four other cypresses, *C. goveniana, C. macnabiana, C. sargentii,* and *C. bakeri.*

A few words are necessary also on the subject of names. Over the whole matter of the colloquial names of trees a mild anarchy reigns, and this is particularly the case in regard to the family of the Coniferæ, which includes a large number of individuals bearing a general resemblance to other members of their own or even of a different genus. Such words as "black," "white," "red," "silver," "scrub," and so forth, are applied carelessly, and often with no particular fitness, to distinct

trees in different localities; while the use of such terms as "jack," "bull," etc., approaches the humorous in its hopeless irrelevance. Even the main divisions of genus are commonly disregarded, firs being often called spruces, spruces hemlocks, and all and sundry pines. As an instance may be cited the well-known "Douglas-spruce," *Pseudotsuga taxifolia:* it is known to most lumbermen as Red-fir or Douglas-fir; the timber is everywhere sold as Oregon pine; yet the tree is neither spruce, fir, nor pine, but a "false" hemlock. It seemed necessary, however, in a book of this description, to note all the commonly used names of each tree, following the botanical name, rather than risk throwing the reader off the scent. The first of the names given in each case is the one which the writer finds most generally preferred by authorities, and hence it is the one which he would recommend to his readers and under which it appears in the index.

As regards the botanical names, also, some confusion exists, due to various causes: sometimes to actual difference of opinion as to the identity of trees, sometimes to a question of priority of publication of the names given by different botanists to a newly discovered species, sometimes to accidental causes such as mixture of seeds or specimens. The nomenclature here followed is that of Professor W. L. Jepson, of the University of California, in his "Flora of California," now issuing from the press. It seemed best in a few cases to give alternative designations, but this has been done only when the differing names have appeared in authoritative current works.

The photographs used to illustrate this book, with the exception of two which are noted as having been courteously supplied by the Forest Service of the Department of Agriculture, were taken by the writer especially for this purpose. The line-drawings are the work of my friend, Mr. Carl Eytel, and were made directly from the specimens with the exception of the two which are stated as being re-drawn from "The Silva of North America" of Professor C. S. Sargent, by kind permission of the publishers, Houghton Mifflin Company, of Boston, Mass.

The writer has pleasure in acknowledging his indebtedness to the works of other and more scientific authors, notably to the superb "Silva of North America," referred to above, and to the admirable publication of the United States Department of Agriculture, "Forest Trees of the Pacific Slope," by Mr. George B. Sudworth, Dendrologist of the Forest Service; by reference to which the writer has been able to check and verify his own studies in the field.

J. S. C.

Los Angeles, California,
January, 1911.

CONE-BEARING TREES

OF THE

CALIFORNIA MOUNTAINS

SUGAR-PINE

Pinus lambertiana

PINUS LAMBERTIANA

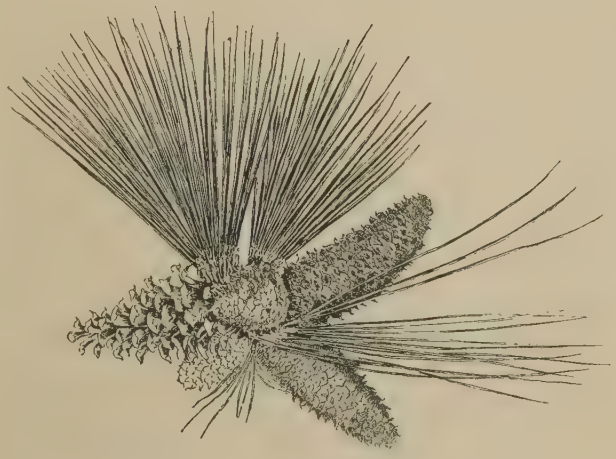
(SUGAR-PINE)

THE finest of all the pines, both in beauty of tree and value of its timber. The stem is perfectly straight, round, and tapered, and in favorable positions the full-grown tree is from

150 to 200 feet or more high, and from 4 to 8 or more feet in diameter. Mature trees have a very open, wide crown of irregular, often horizontal branches, of which a few extend far beyond the others. It grows freely on the western slope of the Sierra Nevada at from 3,000 to 7,000 feet elevation, and to a limited extent on the eastern slope, and continues through the mountains of Southern California and on into Lower California at slightly higher ranges. BARK is 2 or 3 inches thick, of a handsome brown or reddish color with a purple tinge, regularly and finely broken. LEAVES grow 5 in a cluster, are dark green, and from 3 to 4 inches long. CONES are the longest and most beautiful of all cones, from 12 to 20 inches long, sometimes longer; straight, slender, pointed, hanging on short stems from tips of upper branches: green when growing, clear light brown when dry. The "sugar" is found in the form of grains where wounds have occurred on the trunk. It is medicinal, and should not be used over-freely.

YELLOW-PINES

Pinus ponderosa



PINUS PONDEROSA

(YELLOW-PINE, PITCH-PINE, BULL-PINE, SILVER-PINE, WESTERN YELLOW-PINE)

A STRAIGHT, symmetrical tree of 125 to 150 feet average height, or up to 200, and from 3 to 6 or even 8 feet thickness: valuable for its timber. In its typical growth it forms a remarkably perfect slender pyramid: in old trees the lower branches trend strongly down in angular reaches. It grows freely on the western slope of the Sierra Nevada at as low

as 1,500 feet, but in the central and southern parts of the range it begins at about 2,500 feet and is found up to 6,000 feet. In the Southern California mountains it grows at from 3,000 or 4,000 up to 9,000 feet. BARK ranges from pale buff to reddish brown, and on old trees is 3 or 4 inches thick and forms large, irregular plates, often 3 or 4 feet long and 1½ feet wide. LEAVES in 3s, from 5 to 11 inches long, bright yellowish green, borne in star-like clusters at ends of twigs. CONES 3 to 6 inches long, pointed oval when open, often in clusters: green or sometimes purple when mature, light red-brown when dry. Scale-tips have a short prickle. Cones are stemless and often some of the small unopened base-scales remain attached to the tree when the cone falls.

JEFFREY-PINE

Pinus ponderosa var. jeffreyi

Open growth

PINUS PONDEROSA var. JEFFREYI

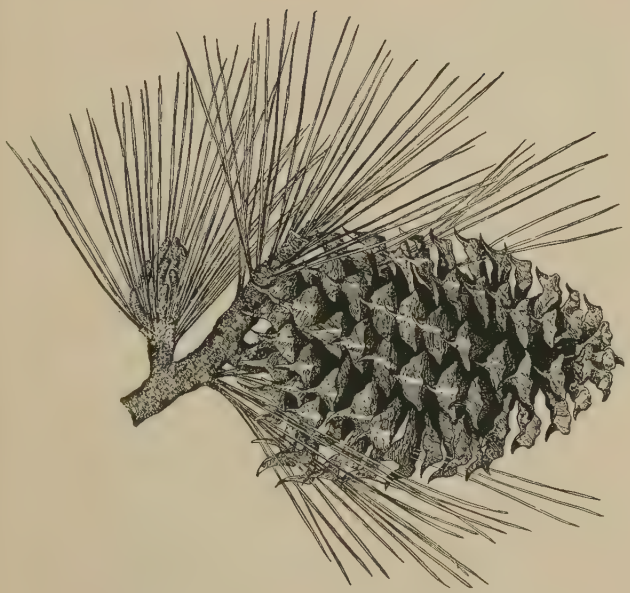
(JEFFREY-PINE)

THIS tree is considered by many authorities to be a species separate from the preceding, and is called by them *P. jeffreyi.* Certainly the two types merge into one another in a very confusing manner. Generally speaking, the Jeffrey-pine is a somewhat smaller but wider branched tree, and the branches are less angular. BARK is redder and broken into

smaller plates. LEAVES are similar to those of the typical *ponderosa* but of a bluer shade and hardly as long. CONES are very much larger and somewhat rounder, from 6 to 11 inches long; otherwise similar. The tree does not descend so low as the regular *ponderosa,* but mixes with it in its middle and upper ranges and continues beyond it, growing often on high, exposed ridges where it suffers extreme dwarfing and appears in remarkable shapes. It grows well on the eastern slopes of the Sierra Nevada, reaching out on to the high desert levels of Inyo and Mono Counties, and is found on the mountains of the San Gabriel Reserve and on San Bernardino, San Jacinto and the Cuyamaca Mountains.

COULTER-PINE

Pinus coulteri



PINUS COULTERI

(COULTER-PINE, BIG-CONE-PINE, PITCH-PINE, BULL-PINE)

A STURDY tree, well branched and heavily foliaged, seldom over 70 feet in height and 4 feet in diameter. The branches often grow almost to the ground, and, spreading widely, give to the tree a sharp conical form. It has a general resemblance to the *ponderosa* and *jeffreyi* species, and is some-

times found growing with them. It is common in the mountain ranges of Southern and Lower California, and grows also in some parts of the Coast Range but not north of the latitude of San Francisco. Its range of altitude runs from 2,500 up to 6,500 feet. This pine or the Douglas-spruce is usually the first of the conifers met in ascending the mountains of Southern California. BARK is very dark brown, rugged, and thick near base of tree. LEAVES are 3 to a cluster, stiff, strong, dark bright green, usually erect, with an average length of about 10 inches, and grow in dense brushy masses on very thick branchlets. CONES are very large and heavy, often over a foot long and 6 or 7 inches thick, the scales prolonged into formidable claws. They generally grow singly but occasionally two or three together, and are sometimes produced on the main stem. In falling, the cone breaks near the base, leaving some of the scales attached to the tree.

DIGGER-PINE

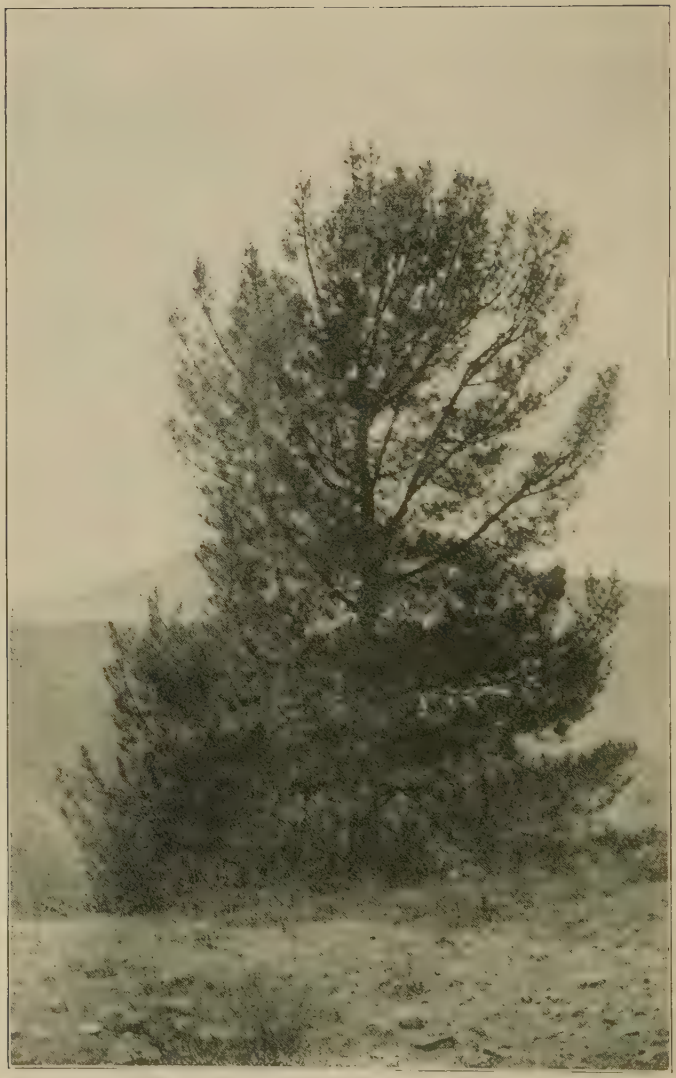
Pinus sabiniana

PINUS SABINIANA

(DIGGER-PINE, GRAY-PINE, BULL-PINE, PIÑON-PINE, NUT-PINE)

A THIN-FOLIAGED, spindling tree, average height 40 to 60 feet and thickness 1½ to 2 feet, usually dividing into several straight, upward-growing arms: quite unlike any other pine in the manner of growth. The first pine met in ascending the western slope of the Sierra Nevada throughout Central California,

ranging between altitudes of about 1,000 to 3,000 feet. Grows on dry, hot foothills, but not known south of the Tehachapi. BARK is dark grayish brown, deeply furrowed. LEAVES in sets of 3, from 8 to 12 inches long, sparse, drooping, grayish green. The tree gives hardly any shade. CONES are from 6 to 10 inches long, round-oval, coffee-brown when ripe. They grow on stout stems and do not easily fall from the tree. Scale-tips bend down and outward, ending in strong, thorny points. The wood is not of value except for firewood, but the seeds are eaten by the Digger Indians. (These seeds are not the true piñons, which are borne by the Single-leaf pine, *P. monophylla.*)



KNOB-CONE-PINE

Pinus tuberculata

PINUS TUBERCULATA

Also called *P. attenuata*

(KNOB-CONE-PINE, SCRUB-PINE)

USUALLY a small, slender, straight-growing tree of from 20 to 40 feet height, sometimes much taller, and 1 to 1½ feet diameter, but often found with a forked stem, and sometimes of a round, bushy growth. It grows in

small isolated areas on the western slope of the Sierra Nevada, usually at altitudes of from 2,000 to 5,000 feet; also in the Coast Range and on the southern slope of the San Bernardino Mountains, and possibly on San Jacinto Mountain. BARK is thin, dull grayish brown, somewhat furrowed. LEAVES grow in 3s and are from 4 to 7 inches long, slender, pliable, of a clean light green. CONES are from 5 to 7 inches long, pointed, slightly curved, set often in circles attached, points downward, directly to branches or main stem. They remain indefinitely on the tree with scales unopened, so that the trees are only propagated by accident, as when fire or storm overthrows them. The scales bear prickles and are often developed into strong, curved hooks on the convex side of the cone. Color of dry cones is light brown. The trees bear cones when a few years old, but the age limit is not known as fire is almost always the cause of death; they are not thought to be long-lived.

TAMARACK

Pinus murrayana

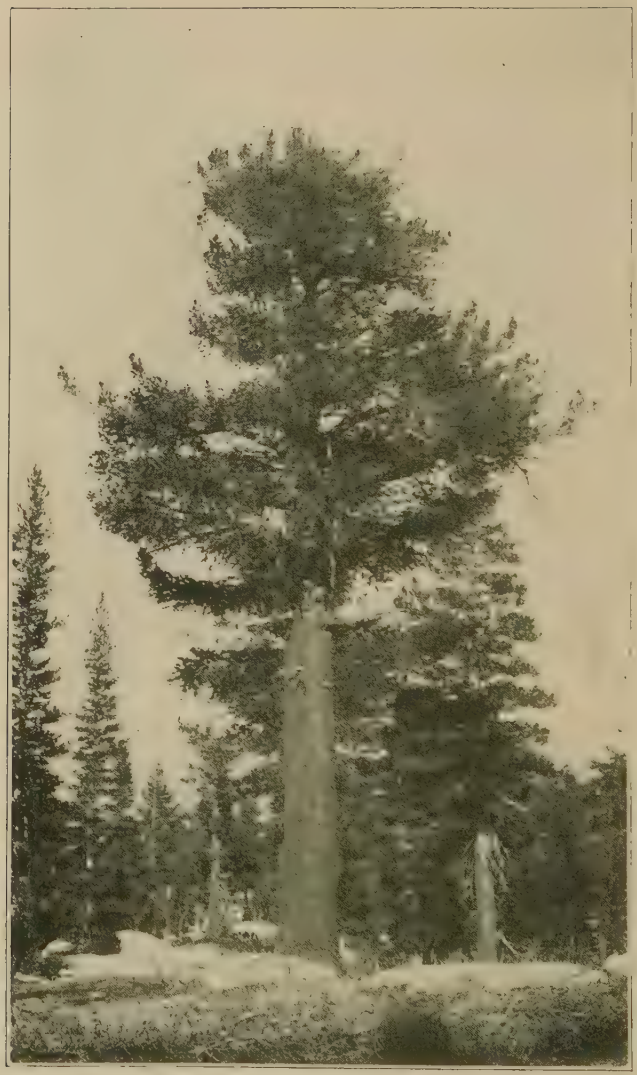
Open growth

PINUS MURRAYANA

(TAMARACK, LODGE-POLE-PINE)

THIS tree, the common "tamarack" of the Sierra, is by some botanists considered to be a variety of the species *contorta,* but is now usually distinguished as a separate species, apart from *P. contorta,* the "Scrub-pine" of the coast regions. In close stands it is a straight, slim tree of from 50 to 100 feet height and 2 to 3 feet thickness, scanty of foliage, and bare of branches for half its height. Where it grows more openly it does not exceed 60 feet in height

and the foliage is denser and continues to the ground. It has an unusually wide range, of from 4,000 to 10,000 feet, mainly on the western slope of the Sierra Nevada, where it forms great homogeneous forests, but extending in places to the eastern side. Where it reaches timber-line it is often much dwarfed. It grows also on some peaks of the San Gabriel Reserve and on the San Bernardino and San Jacinto Mountains, and extends into Lower California. BARK is thin, smooth, and scaly, peeling off in sheets like birch-bark; usually gray but somewhat brownish; in exposed places verging on red: and so resinous that the tree suffers to an exceptional degree from fire. LEAVES are in 2s, from 1½ to 3 inches long, stiff, yellowish green, tufty or "foxtail" in manner of growth. CONES are 1½ to 2½ inches long, bright green when growing, red-brown when dry. The scales open and curve backward like flower petals, except the unfertile scales at the bottom, which remain closed, forming a flat base. The timber is of fair quality and will in time be valuable.



SILVER-PINE

Pinus monticola

PINUS MONTICOLA

(SILVER-PINE, MOUNTAIN-PINE, LITTLE SUGAR-PINE, WESTERN WHITE-PINE)

A STURDY tree, carrying heavier branches than do most pines (often with one or two very much developed), and reaching a height of 100 or occasionally 150 feet, with a diameter of from 3 to 6 or more feet. It is found at elevations of from 6,000 to 10,000 feet on the western face of the Sierra Nevada as far south as the headwaters of the Kern

River; also to some extent on the eastern slope. It attains its finest growth at the greatest altitudes. BARK is about 1 inch thick, cinnamon red, checked into small squarish plates. LEAVES are 5 to a cluster, blue-green, and from 2 to 4 inches long. CONES are from 5 to 10 inches long, slender, pointed, usually curved, borne on stout stems: green when growing, changing to purple: light brown when dry: much resembling the cones of the Sugar-pine, but not half the size. The timber is almost equal in grade to that of the Sugar-pine.

FOXTAIL-PINE

Pinus balfouriana

Photograph kindly supplied by Forest Service, U. S. Department of Agriculture

Re-drawn from Sargent's "Silva of North America," by permission of the publishers, Houghton Mifflin Co., Boston, Mass.

PINUS BALFOURIANA

(FOXTAIL-PINE, BALFOUR-PINE)

A LITTLE-KNOWN species occurring irregularly and at high altitudes, at or near timber-line. Mature trees are usually about 40 or 50 feet high and from 2 to 3 feet thick. The tree is not so shapely as most pines, the branches being very unequal in length and the top of the main stem often broken or dead. It

is found near the southern end of the Sierra Nevada, from the region of the South Fork of the San Joaquin River southward to the South Fork of the Kern, and occurs also in the neighborhood of Mt. Shasta and in the northern Coast Range. BARK is dark warm brown (lighter and redder in exposed situations), rather thin, broken into rectangular plates. LEAVES grow in sets of 5, are about 1 inch long, stiff, bright green, curved, arranged in a close, brushy manner at and near the ends of the branchlets (whence its common name of "foxtail-pine"). CONES are oval, from 3 to 5 inches long, pendent from the ends of branchlets, dark purple when growing, changing to red-brown when dry.

LIMBER-PINE
Pinus flexilis

PINUS FLEXILIS

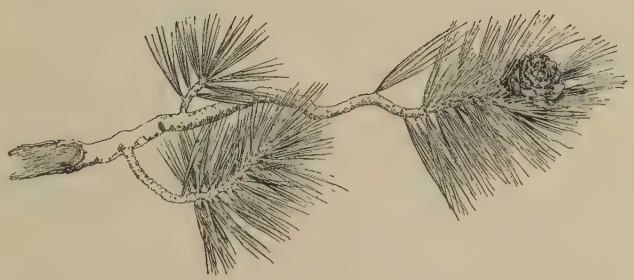
(LIMBER-PINE, WHITE-PINE)

A RATHER small, irregularly shaped tree, from 30 to 50 feet in height (occasionally taller), and from 2 to 4 feet in diameter, with long branches which often grow almost to the ground. It is a somewhat rare species in California, and inhabits only high altitudes of from 8,000 up to 12,000 feet. Its northern limit in

this State is Bloody Cañon, east of the Yosemite, from whence southward it occurs irregularly on both slopes of the Sierra Nevada and continues to the Sierra Madre, San Bernardino, and San Jacinto Mountains. It is also found at high elevations on the desert ranges of South-eastern California. BARK of old trees is very dark brown, deeply checked into small oblong blocks. The bark of small branches and twigs is often white. LEAVES grow 5 in a cluster, are from 1 to 3 inches long, yellowish green, stiff, curved, and produced in dense tufts at ends of branchlets. CONES are pointed oval, from 3 to 10 inches long (but not often over 5 inches), stemless or nearly so, with wide, rounded scales much thickened at the tips. The small scales at the top are usually reflexed. Color is light olive green when growing, clear light brown when dry. They are borne often on quite small trees.

WHITE-BARK-PINE

Pinus albicaulis



PINUS ALBICAULIS

(WHITE-BARK-PINE, WHITE-PINE, DWARF-PINE, ALPINE WHITE-PINE)

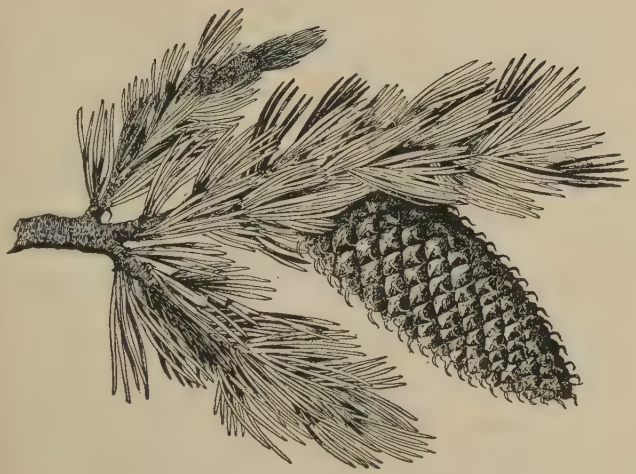
A LOW-GROWING, straggling tree, seldom more than 40 feet in height, usually taking the form of a group of poles leaning at various angles, and, in exposed positions, often creeping in dense mats along the ground. It is the tree of the highest altitudes, appearing as timber-line is approached and continuing in dwarfed forms up to the limit of tree life, which is at about 11,000 or 12,000 feet. It is found on both sides of the crest of the Sierra

Nevada, and as far south as the San Bernardino Mountains. BARK is thin, gray or whitish, smooth except at base of stem. LEAVES are in clusters of 5, from 1½ to 2½ inches long, of a clean bright green, growing in thick tufts at the ends of stout branchlets which are extremely tough and pliable. CONES are oval or nearly round, from 1½ to 3 inches long, deep purple or almost black, formed of a small number of thick, blunt scales; the color changes to brown as the cones dry.

BRISTLE-CONE-PINE

Pinus aristata

Photograph kindly supplied by Forest Service, U. S. Department of Agriculture



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PINUS ARISTATA

(BRISTLE-CONE-PINE, FOXTAIL-PINE, HICKORY-PINE)

A RATHER small, bushy tree, seldom over 40 feet high and from 2 to 3 feet thick, of very limited occurrence in California, where it is found at high elevations on the desert ranges of the south-eastern part of the State. It is reported to grow scatteringly also on the eastern slope of the Sierra Nevada near the Yosemite National Park, but the writer has failed to discover it there. The tree may almost be said

to be habitually irregular in shape, the main branches being heavy and much specialized and the stem often broken, the effect largely of the stormy regions it inhabits. BARK of mature trees is dark brown, slightly reddish, and not deeply checked. LEAVES are in clusters of 5, from 1 to 1½ inches long, stiff, somewhat curved, deep green, growing in dense masses for a foot or so along the ends of the branchlets. CONES are egg-shaped, about 3 inches long, dark red-brown when ripe, the scales tipped with rather long, sharp, thin prickles which curve toward the top of the cone. The tree is easily indentified by this peculiarity of its cone.

SINGLE-LEAF-PINE
Pinus monophylla

PINUS MONOPHYLLA

(SINGLE-LEAF-PINE, NUT-PINE, PIÑON)

USUALLY a low, angular-branched tree, more like a small oak than a pine in habit of growth, and from 15 to 20 feet high; occasionally running up to as much as 50 feet with a crooked, spindling stem and short branches. Young trees are bushy but symmetrical, having the shape of a wide, rounded cone. The species is widely distributed over the dry desert slopes of the mountain ranges of Southern and South-eastern California, and is found on

the eastern slope of the Sierra Nevada as far north as about the latitude of Lake Tahoe; also on the western slope in a few dry localities and on the Tehachapi and neighboring cross-ranges. It inhabits in its various localities a wide range of altitude, from 2,500 to 9,500 feet, but always under desert conditions of soil and climate. BARK is dark brown, approaching black, and much fissured. LEAVES are from 1¼ to 2¼ inches long, stiff, sharp-pointed, light green, and grow singly instead of in sets of 2, 3, 4, or 5 as do those of all other North American pines. CONES are from 1½ to 2½ inches long, egg-shaped and bright green while growing, dark brown and irregularly globular when dry, formed of a small number of thick, blunt scales. They are borne profusely, mainly near the top of tree. Quite young trees produce cones. The seeds are large and palatable, and are used by the Indians for food: they are also sold in fruit-stores as "piñon-nuts."

FOUR-LEAF-PINE

Pinus parryana

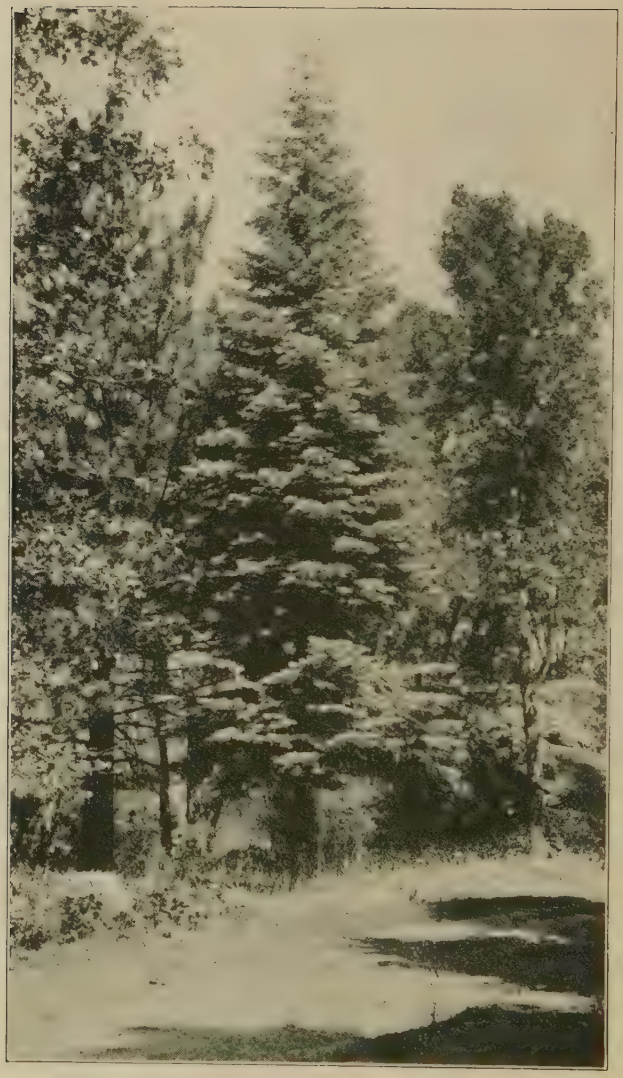
PINUS PARRYANA

Also called *Pinus quadrifolia*

(FOUR-LEAF-PINE, PARRY-PINE, NUT-PINE, PIÑON)

A SMALL, trim tree, branching thickly and to the ground, very similar in general appearance to *P. monophylla,* but unlike it in usually keeping its formal shape when past maturity. The branches divide and subdivide to an unusual degree, curving upwards and giving the tree a dense, bushy appearance. It rarely exceeds 30 feet in height and 1½ feet

in diameter. The species is interesting by reason of its very limited habitat, being found (in the United States) only on the mountain ranges of extreme Southern California, south of San Jacinto Mountain, and there only scatteringly, though it is more plentiful in northern Lower California. In range of altitude it overlaps the upper limit of *P. monophylla*,—in that region about 4,000 feet. BARK of the trunk is rough and dark reddish brown; that of branches and twigs is light gray. LEAVES are generally in sets of 4, but occasionally appear in 3s or 5s. (The unopened clusters at the ends of twigs may easily be mistaken for single leaves, and this, with the general likeness of tree and cone to the *monophylla* species, may lead the unwary into error.) They are from 1 to 1¾ inches long, curved, and pale green. CONES are egg-shaped or round, 1½ to 2 inches long, consisting of a few thick, irregular scales, and bearing large, edible seeds similar to those of the *monophylla*, and, like them, a valuable article of food to the Indians of the localities where the tree is found.



WHITE-FIR

Abies concolor

A young tree

ABIES CONCOLOR

(WHITE-FIR, BALSAM-FIR, WHITE SILVER-FIR)

A VERY handsome, straight, spire-shaped tree with short branches, from 150 to 200 feet in height and 5 to 6 feet in diameter. It is remarkable for its perfect symmetry when young and for the extreme regularity of its branching, the twigs and branchlets forming graceful horizontal sprays. It grows freely on the western slope of the Sierra Nevada, and to some extent on the eastern, at elevations of

from 4,000 to 8,000 feet, and is common in the mountains of Southern California at somewhat higher altitudes, continuing into Lower California. BARK of mature trees is dark ashy gray, thick, much roughened when old. LEAVES are from ¾ to 2 inches long, pale green, set usually in flat, lateral rows, herringbone fashion, but often found turning upwards on the topmost branches and sometimes on others. CONES are from 3 to 5 inches long, cylindrical, growing upright on the upper and outer branches. They are pale dull green in color and break up while on the tree. The foliage of both this and the following described species, *A. magnifica*, is strongly fragrant. The timber is of good quality but is not yet much used.

RED-FIR
Abies magnifica

ABIES MAGNIFICA

(RED-FIR, BALSAM-FIR, MAGNIFICENT SILVER-FIR)

A TREE almost exactly similar in general habit of growth to the preceding (*A. concolor,* WHITE-FIR), and even its superior in size and stateliness, fully deserving its specific name. It grows often to over 200 feet in height and up to 8 or 9 feet in diameter. The original single top is frequently broken off and replaced by several upright spars, themselves often dead. It is commonly found with the White-fir but does not (except in its northern range) descend below 6,000 feet elevation

while it extends up to 10,000 feet. It is not found in the mountains of Southern California. BARK is dark smoky red or purple in color, thick, deeply furrowed. LEAVES are from ½ to 1 inch long, growing all around the twigs but curving up so that they stand upright like thick short grass. The mature foliage is dark green, the new young growth delicate silvery light green. CONES are from 5 to 8 inches long, cylindrical, at first light green but ripening to purple on the sunward side. They grow upright on the top and outer branches and break up while still on the tree. A variety of this species known as *shastensis* is found on Mt. Shasta and on the high peaks at the southern end of the Sierra. It is distinguished by the protruding bracts of the cone-scales. The tree yields a good quality of timber.

DOUGLAS-SPRUCE
Pseudotsuga taxifolia

PSEUDOTSUGA TAXIFOLIA

Also called *P. douglasii* or *P. mucronata.*

(DOUGLAS-SPRUCE, DOUGLAS-FIR, HEMLOCK, RED-FIR)

A TALL, straight, slender tree, varying (in California) from 150 to 200 feet high and from 4 to 6 feet in diameter when full grown, but reaching still larger size in the great forests of Oregon and Washington, of which it is the most prolific and valuable tree and where it is commonly called Red-fir by lumbermen. In Northern and Central California it grows usually mixed with other conifers, at altitudes of from 2,000 to 7,000 feet. It is found on the western slope of the Sierra Nevada and in the Coast Range. In the mountains of Southern California a different species, *Pseudotsuga*

macrocarpa, BIG-CONE SPRUCE, takes its place, and is usually the first of the coniferous trees met in ascending them. It is not so large as the northern species, seldom exceeding 80 feet in height and 3 in diameter, but more widely and heavily branched. BARK (of both species) is dark smoky brown, often very thick and roughly furrowed. LEAVES are from ¾ to 1¼ inches long, growing singly on trailing feathery branchlets. When leaf-buds first open the young foliage is bright yellow-green, changing later to dark blue-green. CONES of northern species are from 2 to 4½ inches long; of southern, from 3½ to 7 inches; both long-oval and bright green when growing; round-oval and dark brown when dry. Both these trees are clearly known by the long, protruding, 3-pointed bracts which grow between the shell-like scales. The lumber of the northern species is the "Oregon pine" (so-called) of commerce, the most useful and valuable of Western forest products. The bark is used considerably in tanning. The tree is known to live for several hundred years, and is, next to the two Sequoias, the largest of American trees.

INCENSE-CEDAR

Libocedrus decurrens

A young tree

LIBOCEDRUS DECURRENS

(INCENSE-CEDAR, POST-CEDAR, WHITE-CEDAR, BASTARD-CEDAR)

A DISTINCTIVE, handsome tree of up to 125 feet height but seldom over 100 feet, with a diameter of from 3 to 6 feet. Old trees spread much at the base and are almost always dead in their tops, with one or more heavy upright limbs standing up parallel to the main stem. Young trees form very symmetrical, dense pyramids, branched almost or quite to the ground. The tree is found mixed with

other conifers on the western slope of the Sierra Nevada (and on the eastern in a few localities in the north) at altitudes of from 2,500 to 7,000 feet. It grows also in the Coast Range and in the mountains of Southern California at from 3,000 to 8,000 or 9,000 feet, and continues into Lower California. BARK is cinnamon red, ridged vertically, smooth and lustrous, and may be stripped off in long plates or thin ribbons. LEAVES are minute, scaly bodies, growing in continuous series and forming flat, ferny sprays of rich design and color, which is a deep yellowish green. CONES are slender, vase-shaped, from ¾ to 1 inch long, formed of (apparently) 2 scales. They are yellowish when ripe, drying to reddish brown. Bark, foliage, and cones are exceedingly fragrant. The timber is very durable and is valuable for many purposes.

MOUNTAIN-HEMLOCK

Tsuga mertensiana

A group of young trees

TSUGA MERTENSIANA

Also called *T. pattoniana*

(MOUNTAIN-HEMLOCK, SIERRA-HEMLOCK, BLACK-HEMLOCK, PATTON-SPRUCE, HEMLOCK-SPRUCE)

A VERY beautiful and variable tree, which when young much resembles the "Himalaya-pine" (*Cedrus deodara*) often grown in gardens. At its best growth it is a straight, slender tree with a height of 100 feet or more and a diameter of 3 or 4 feet; but in the high regions it inhabits it seldom grows more than 50 feet high, often branching from the ground, frequently much bent and stunted, sometimes

prostrate. The growth of the young tree is particularly graceful, the leaders and the tips of the branches fragile and drooping. It is found at altitudes of from 7,000 to 11,000 feet (somewhat lower in the northern part of the State), and grows on the western slope of the Sierra Nevada as far south as the South Fork of King's River. (Said to have been found also on San Jacinto Mountain.) BARK is usually grayish brown but on quite old trees often bright red-brown. LEAVES are short, from ½ to ¾ inch in length, rather thick, growing in close tufts all along the branchlets. The mature foliage is of a dark, sombre hue, but the young growth has a charming silvery color. CONES are oval, ¾ to 2 inches long, on stems, usually purple when ripe but sometimes yellow-green, resembling large olives, and are borne very profusely. As they dry they change to brown and the scales are often reflexed. The tree grows slowly, and is believed to be very long-lived.

BIG-TREE

Sequoia gigantea

A very old tree known as "Grizzly Giant," in the Mariposa Grove

SEQUOIA GIGANTEA

Also called *S. washingtoniana* or *S. wellingtonia*

(BIG-TREE, SEQUOIA, REDWOOD)

THE famous Big-Tree of California, the greatest of trees, and of an age that extends to thousands of years (certainly to 4,000, possibly much more). It grows only on the western slope of the Sierra Nevada, in a number of isolated localities of which the most northerly is in Placer County and the most southerly in Tulare County, at elevations between 5,000 and 8,500 feet. Full-grown trees reach an average height of from 250 to 300 feet with a diameter of from 25 to 30 feet measured close to the ground (perhaps one-third less if measured above the swell of the base). A few

trees exceed the largest of these dimensions. Mature trees have usually 100 to 150 feet of the stem clear of branches. The top takes the shape of a rounded cone, or dome. BARK is soft, from 1 to 2 feet thick, bright cinnamon-red, grooved vertically, and formed of thin flaky layers. LEAVES are small, scaly, and bract-like, dark blue-green in color, growing in branching sprays which form loose drooping bunches or tassels. CONES are small, round-oval, from 1½ to 2½ inches long, pendent on stout stems, and formed of a small number of scales which are diamond-shaped at the exposed ends. They are yellowish green in color, becoming dull coffee-brown when dry.

Nearly all of these trees are now enclosed for preservation in National Parks.

The Redwood of the lumberman is a different and more abundant species, *S. sempervirens*. It inhabits the seaboard and the Coast Ranges and is not found in the Sierra. It grows to an equal or even greater height, but does not attain quite the girth nor the enormous age of the Sierra species.

SIERRA-JUNIPER

Juniperus occidentalis

JUNIPERUS OCCIDENTALIS

(SIERRA-JUNIPER, WESTERN-JUNIPER)

A VARIABLE tree, usually short and stumpy, often twisted into grotesque shapes, with a few thick limbs making the tree wider than it is high. In sheltered places it is more conventional in growth, but it is rarely over 30 feet high, though sometimes as much as 60 feet, and is of great diameter, up to 6 feet or more, tapering rapidly as the heavy limbs are given off. It grows scattered on bleak mountain ledges at from 6,000 to over 10,000 feet (lower in its northern range), on both slopes of the Sierra Nevada, and continues southward to the

San Bernardino Mountains and possibly through the San Jacinto Mountains into Lower California. BARK is about 1 inch thick, bright brown-red, smooth, fibrous, stripping off in ribbons. LEAVES are minute and scaly, set in lines with a braided appearance, sage-green in color, growing in branching tufts. BERRIES (technically "cones") are small, round or oblong, about ¼ inch in diameter, blue-black, covered with bloom. The wood is fragrant and cedar-like, and the tree lives for many hundred years.

A slightly different species, *J. californica*, CALIFORNIA-JUNIPER, grows throughout Central and Southern California, generally at low elevations, inhabiting mainly the desert slopes of the mountains and extending into Lower California. The tree is similar in habit but smaller than *J. occidentalis*, the bark grayer and more grooved, and the berries larger, up to ½ inch in diameter, and reddish in color.

Another species, *J. communis*, DWARF-JUNIPER, is found on Mt. Shasta and the northern Sierra Nevada as far south as Bloody Cañon Pass, at high elevations. It is a shrub, with dark, red-brown bark, bristly leaves much

larger than the minute leaves of other junipers, and oval, blue-black, sweet berries.

Still another species, *J. utahensis,* DESERT-JUNIPER, grows at high altitudes in the desert ranges of South-eastern California. It is a low, bushy tree, with ashy-gray bark and a small. sweet, blue-black berry.

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